

Severe decrements in cognition function and mood induced by sleep loss, heat, dehydration, and undernutrition during simulated combat.

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Severe decrements in cognition function and mood induced by sleep loss, heat, dehydration, and undernutrition during simulated combat

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Background

Military exercises generate high levels of stress to simulate combat, providing a unique opportunity to examine cognitive and physiologic responses of normal humans to acute stress.

Methods

Cognitive and physiologic markers of stress were evaluated before, during, and after an intense training exercise conducted for 53 hours in the heat. Cognitive performance, mood, physical activity, sleep, body composition, hydration, and saliva cortisol,

testosterone, and melatonin were assessed. Volunteers were 31 male U.S. Army officers from an elite unit, aged $31.6 \hat{\pm} .4$ years.

Results

Wrist activity monitors documented that soldiers slept only $3.0 \hat{\pm} .3$ hours during the exercise and were active throughout. Volunteers lost $4.1 \hat{\pm} .2$ kg ($p < .001$) of weight, predominately water ($3.1 \hat{\pm} .3$ L) ($p < .001$). Substantial degradation in cognitive function, assessed with computerized tests, occurred. Vigilance, reaction time, attention, memory, and reasoning were impaired ($p < .001$). Mood, including vigor ($p < .001$), fatigue ($p < .001$), confusion ($p < .001$), depression ($p < .001$), and tension ($p < .002$), assessed by questionnaire, deteriorated. The highest cortisol and testosterone levels were observed before the exercise.

Conclusions

This study quantifies the overwhelmingly adverse impact of multiple stressors on cognitive performance, mood, and physiologic parameters, during a continuous but brief military exercise conducted by highly motivated, well-trained officers.



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Key words

Vigilance; cortisol; nutrition; fatigue; stress; performance

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